

### **REMARKS**

Claims 1-34 were previously pending in this application. By this amendment, Applicant is canceling claims 8, 9, 24 and 26 without prejudice or disclaimer. Claims 1-7, 10-23, 25 and 27-34 have been amended. As a result claims 1-7, 10-23, 25 and 27-34 are pending for examination with claims 1, 20, and 25 being independent claims. No new matter has been added and support for the amendments can be found throughout the application as originally filed.

### **Claim Objections**

Claims 7-9 15, 16, 19, 20, 21-23, 25, 30, and 34 have been amended to overcome the objections. Specifically, claims 7, 15, 16, 19, 21-23, 25, 30, and 34 have been amended to correct typographical errors and for clarity purposes, to overcome the objections.

Additionally, claims 8 and 9 have been cancelled, and therefore objections to these claims are now moot.

Accordingly, reconsideration and withdrawal of the objections to claims 7-9 15, 16, 19, 20, 21-23, 25, 30, and 34 is respectfully requested.

### **Rejections Under 35 U.S.C. § 112**

Claims 21, 22, 23, 24 and 29 were rejected as being indefinite under 35 U.S.C. § 112.

Applicant disagrees with the rejection of claim 21 because a “predetermined quantity” is a specific concentration that can be typically determined or chosen by a user of the method, or by the controller of the system. In the present application, for example, one skilled in the art would determine the quantity of suspended solids in the reverse osmosis reject that would be sufficient to allow it to be returned to an impure water source. (See Application at page 5, lines 6-9.)

Applicant also disagrees with the rejection of claims 22 and 23 because “a suspended solids content sufficient to allow it to be returned” to either the impure water source or to the ocean is a suspended solids content that can be typically determined or chosen by the user of the method, or by the controller of the system. One skilled in the art would be able to readily define a “sufficient” suspended solids content for allowing it to be returned to either the impure water source or the ocean because it can be the content, for example, that provides discharge levels that may not be exceeded by regulations. (See Application at page 8, lines 9-16.) In the present application, for example, one skilled in the art would determine the “sufficient” suspended solids

content because, given that the total suspended solids are a function of the feed water, and that the discharge levels are regulated by permit, the overall recovery of the plant may be controlled such that the discharge levels would not be exceeded. (See Application at page 8, lines 9-16.)

Applicant also respectfully requests the withdrawal of the rejections of claim 24 and 29 under 35 U.S.C. § 112, second paragraph. Claim 24 has been cancelled, and therefore this rejection is now moot. Additionally, Applicant confirms that the Examiner's assumption that claim 29 depends from claim 28 is correct, and has amended claim 29 accordingly.

Accordingly, reconsideration and withdrawal of rejections of claims 21-24 and 29 under 35 U.S.C. § 112, second paragraph is respectfully requested.

#### Rejections Under 35 U.S.C. § 102

Claims 1-2, 6-10, 17 and 20 were rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Daly, et al. in U.S. Patent No. 6,120,688 (hereinafter "Daly"). Applicant disagrees with this rejection because Daly fails to teach each and every limitation recited in independent claims 1 and 20.

The teaching of Daly discloses a method of purifying impure water using an apparatus, comprising the steps of providing a microfiltration unit, a first reverse osmosis unit, a second reverse osmosis unit, and a clean-in-place (CIP) tank containing concentrated retentate. The concentrated retentate is used to backflush the microfiltration unit. (Daly at col. 2, line 55 – col. 3, line 21; and col. 6, lines 45-67.)

Daly does not disclose the present invention as recited in claim 1. Specifically, Daly does not disclose a method of purifying impure water comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream.

Additionally, Daly does not disclose the present invention as recited in claim 20. Specifically, Daly does not disclose a method of facilitating the purification of impure water, the method comprising, in part, the steps of providing a secondary microfiltration or ultrafiltration unit to produce a filtered reverse osmosis stream, and providing a controllable fluid pathway for directing the filtered residual reverse osmosis feed to backwash said primary microfiltration or ultrafiltration unit, as recited in claim 20.

Dependent claims 2, 6-10, and 17, which depend directly or indirectly from independent claim 1, are not anticipated by the teaching of Daly for at least the reasons stated above.

Therefore, for at least the reasons stated above, claims 1-2, 6-10, 17 and 20 are novel over the teaching of Daly.

Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102 is respectfully requested.

#### Rejections Under 35 U.S.C. §103

Dependent claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claim 1.

Applicant disagrees that claim 3 would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claim 1. As discussed above, Daly does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream, as recited in claim 1. Further, as the Examiner acknowledges, Daly does not disclose backwashing the secondary filter. In fact, the rejection refers to an in-line filter of Daly positioned before the reverse osmosis unit (Office Action at page 13, 3<sup>rd</sup> paragraph; see also the Figure of Daly, reference number 54; labeled “10 micron filter.”) The 10 micron filter that the Examiner refers to in Daly is not the same as the secondary filter, as recited in claim 3. (See also the specification, for example, at page 3, lines 11-18 and at page 9, lines 11-18.)

Additionally, the specification of the present application states there is an inherent problem with such an approach as used in Daly, namely that the reverse osmosis concentrated retentate can form scales or particles due to the concentration effects of the reverse osmosis process, or may be contaminated with biological growth. Such particles or biological growth could in fact foul the clean or filtrate side of the microfiltration or ultrafiltration membranes if residual reverse osmosis retentate is used directly to backwash the microfiltration or ultrafiltration membranes. (See specification at page 2, lines 13-20).

Therefore, because Daly fails to disclose each and every limitation of independent claim 1, this claim is not obvious over this reference. Dependent claim 3, which depends from

independent claim 1, further distinguishes the present invention over Daly which fails to include any teaching, suggestion or motivation of the present invention.

Accordingly, reconsideration and withdrawal of the rejection of dependent claim 3 under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 4 and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Marius et al. in U.S. Patent No. 5,059,317 (hereinafter "Marius").

The rejection is improper because no proper *prima facie* case of obviousness has been established. Moreover, any *prima facie* case of obviousness is rebutted because the teachings of Daly and Marius fail to disclose, teach or suggest a method of purifying impure water comprising, in part, treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the microfiltration or ultrafiltration unit, as recited in claim 1, from which claims 4 and 5 depend.

One skilled in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. No implicit or explicit reason, suggestion or motivation has been set forth that would explain why one of ordinary skill in the art would have modified the teaching of Daly with the teaching of Marius that is based on the knowledge of such a person of ordinary skill, from the nature of the problem to be solved, or from any teaching in these references, and result in the claimed subject matter.

As noted above, the teaching of Daly discloses a method for backwashing microfiltration membranes with a concentrated reverse osmosis retentate. (Daly at col. 7, lines 1-3.) Daly does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream, as recited in independent claim 1, which dependent claims 4 and 5 depend from. Further, Daly does not disclose a method wherein the secondary filter is a cartridge filter, or wherein the secondary filter is backwashed, as recited in dependent claims 4 and 5.

The teaching of Marius does not cure the deficiencies of Daly. Marius discloses an apparatus for filtering drinking water using a mixed bed ion exchange device. Marius does not

disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream, as recited in independent claim 1, from which claims 4 and 5 depend. Marius also does not disclose a method using a cartridge filter as a secondary filter, or wherein the secondary filter is backwashed as recited in dependent claims 4 and 5. On the contrary, the teaching of Marius discloses using an ion exchange device to further purify water that has been filtered by a reverse osmosis device to provide drinking water. (Marius at col. 3, lines 32-38.) This is in contrast to the subject matter of the present application, wherein the claims recite that the residual reverse osmosis stream (the retentate, not the filtrate) is processed through a secondary filter.

Thus, one of ordinary skill in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. While Daly uses an additional filtration device in the form of a reverse osmosis unit to provide a retentate, Marius uses an ion exchange device to further filter contaminated water to provide drinking water. Therefore, one of ordinary skill in the art looking to use concentrated retentate from a reverse osmosis unit to backwash a microfiltration unit would not have been motivated to modify the reverse osmosis unit with an ion exchange device that filters the filtrate of a reverse osmosis unit to provide drinkable water.

Even if the teachings of Daly and Marius were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Marius would have produced a method and apparatus for treating contaminated water comprising a microfiltration device, a reverse osmosis device and an ion exchange device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate to be used for backwashing the microfiltration filter. Therefore, the combination of the teachings of Daly and Marius do not teach each and every limitation of dependent claims 4 and 5.

Accordingly, reconsideration and withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 11-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Water Encyclopedia (Jay Lehr, editor, John Wiley & Sons, Inc., New York, 2005) (hereinafter "Encyclopedia.")

Applicant disagrees that claims 11-15 would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claim 1, and further in view of the teaching of Encyclopedia. The rejection is improper because no *prima facie* case of obviousness has been established. Further, any *prima facie* case of obviousness is rebutted because the alleged combination would lack at least one recited element.

One skilled in the art would not have been motivated to combine the teaching of Daly with the teaching of Encyclopedia. As noted above, there is no teaching in Daly to further purify the residual reverse osmosis stream for further use because the concentrated portion, and not the filtered portion, is desired. In contrast, the various chemical, radiation, and physical treatments taught in Encyclopedia are intended to further purify or enhance the stream to provide drinkable water. One of ordinary skill in the art looking to use a serially concentrated reverse osmosis retentate to backwash a microfiltration unit would not have been motivated to then treat the retentate to purify and enhance it. Additionally, the deficiencies of Daly are not cured by the teaching of Encyclopedia. Encyclopedia does not disclose, teach or suggest a method, as recited in claims 11-15. Therefore, the combined teachings of Daly, in view of Encyclopedia would have failed to teach each and every claimed element.

Even if the teachings of Daly and Encyclopedia were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Encyclopedia would have produced a method and apparatus for treating contaminated water comprising a microfiltration device, and a reverse osmosis device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate to be used for backwashing the microfiltration filter. The filtrate of the reverse osmosis device would be further treated by the various water treatments disclosed in Encyclopedia. Therefore, the combination of the teachings of Daly and Encyclopedia do not teach each and every limitation of dependent claims 11-15.

For at least the reasons mentioned above, claims 11-15 would not have been obvious over the teaching of Daly as applied to claim 1 and further in view of Encyclopedia.

Accordingly, reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 16 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable by the teaching of Daly as applied to claims 1 and 17.

Applicant disagrees that claims 16 and 18 would have been obvious to one of ordinary skill in the art over the teaching of Daly, as applied to claims 1 and 17. Daly does not disclose all of the elements of claim 16 and 18. These claims, which ultimately depend from independent claim 1, recites a method comprising, in part, the step of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream.

As discussed above, Daly does not disclose all of the claim elements of independent claim 1. Dependent claim 16 further recites the method comprising subjecting the residual reverse osmosis stream to ultrafiltration or microfiltration by a secondary ultrafiltration or microfiltration unit prior to the step of backwashing. Additionally, dependent claim 18 further recites the method wherein the step of treating comprises filtering using multiple stages of filtration, through a coarse filter prior to filtering through a membrane filter. Daly does not disclose the claim elements of dependent claim 16 and dependent claim 18.

Therefore, because Daly fails to disclose each and every limitation of independent claim 1, this claim is not obvious over this reference. Additionally, dependent claims 16 and 18, which depend from independent claim 1, further distinguish the present invention over Daly which fails to include any teaching, suggestion or motivation of the present invention.

Accordingly, reconsideration and withdrawal of the rejection of dependent claims 16 and 18 under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the teaching of Daly as applied to claim 1, and further in view of Encyclopedia. Applicant disagrees that claim 19 would have been obvious to one of ordinary skill in the art over the teaching of Daly and further in view of the teaching of Encyclopedia. The rejection is improper because no *prima facie* case of obviousness has been established. Further, any *prima facie* case

of obviousness is rebutted because the alleged combination would lack at least one recited element.

As discussed above with regard to claims 11-15, one skilled in the art would not have been motivated to combine the teaching of Daly with the teaching of Encyclopedia. Daly discloses using a concentrated reverse osmosis retentate to backwash a microfiltration unit. Additionally, Encyclopedia does not cure the deficiencies of Daly. Encyclopedia does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream. Thus, the combined teachings of Daly and Encyclopedia would have failed to teach each and every claimed element. Additionally, one of ordinary skill in the art looking to use a serially concentrated reverse osmosis retentate to backwash a microfiltration unit would not have been motivated to then treat the retentate to purify and enhance it with coarse backwashable filters.

Even if the teachings of Daly and Encyclopedia were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Encyclopedia would produce a method and apparatus for treating contaminated water comprising a microfiltration device, and a reverse osmosis device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate. The filtrate of the reverse osmosis device would be further treated by the various water treatments disclosed in Encyclopedia. Therefore, the combination of the teachings of Daly and Encyclopedia do not teach each and every limitation of dependent claim 19.

Accordingly, reconsideration and withdrawal of the rejection of this claim under 35 U.S.C. § 103(a) is respectfully requested.

Claims 25-34 were rejected 35 U.S.C. § 103(a) as being unpatentable over the teaching of Daly, and further in view of Encyclopedia. Applicant disagrees that claims 25 and 27-34 would have been obvious to one of ordinary skill in the art over the teaching of Daly and further in view of the teaching of Encyclopedia. The rejection is improper because no *prima facie* case of obviousness has been established. Further, any *prima facie* case of obviousness is rebutted because the alleged combination would lack at least one recited element.



Again, as discussed above, one skilled in the art would not have been motivated to combine the teaching of Daly with the teaching of Encyclopedia. The teaching of Daly discloses using a concentrated reverse osmosis retentate to backwash a microfiltration unit. The teaching of Daly does not disclose a system for purifying impure water contaminated with a filterable impurity and a dissolved impurity comprising, in part, means for treating the residual reverse osmosis stream to produce a treated residual reverse osmosis stream, and a controllable fluid pathway directing the treated residual reverse osmosis stream to backwash the primary microfiltration or ultrafiltration unit, as recited in claims 25 and 27-34. Additionally, the deficiencies of Daly are not cured by the teaching of Encyclopedia. Encyclopedia does not disclose the system for purifying impure water, as recited in claims 25 and 27-34.

There is no motivation in Daly to further purify the residual reverse osmosis stream for further use because the concentrated portion, and not the filtered portion, is desired. In contrast, the various water treatments described in Encyclopedia are intended to further purify or enhance the stream to provide drinkable water. Therefore, one of ordinary skill in the art looking to use a serially concentrated reverse osmosis retentate to backwash a microfiltration unit would not have been motivated to then treat the retentate to purify and enhance it.

Even if the teachings of Daly and Encyclopedia were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Encyclopedia would produce a method and apparatus for treating contaminated water comprising a microfiltration device, and a reverse osmosis device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate to be used for backwashing the microfiltration filter. The filtrate of the reverse osmosis device would be further treated by the various water treatments disclosed in Encyclopedia. Therefore, the combination of the teachings of Daly and Encyclopedia do not teach each and every limitation of claims 25 and 27-34.

Thus, independent claim 25 would not have been obvious over the teaching of Daly and further in view of Encyclopedia. Additionally, claims 27-34, which depend directly or indirectly from independent claim 25, would not have been obvious for at least the same reasons.

Accordingly, reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 103(a) is respectfully requested.

**CONCLUSION**

In view of the foregoing amendments and remarks, reconsideration is respectfully requested. This application should now be in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762 (Ref. No. M2019-7022US).

Respectfully submitted,  
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Siemens Ref. No.: 2004P87070WOUS  
Memcor Ref. No.: IPD-C337-US  
LLA Ref. No.: M2019-7022US